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ABSTRACT

These competencies for drafting are designed to cover basic principles and practices for beginning drafters. Each competency appears in a one-page format. It is presented as a goal statement followed by one or more "indicator" statements, which are performance objectives describing an ability that, upon attainment, will establish competency for the stated goal. Indicator statements are further qualified by one or more "benchmark" statements or observable behaviors describing what the trainee will do to prove that he/she is demonstrating achievement of the performance objective. Benchmark statements are followed by an "assessment" statement, which describes how the observer determines that the benchmark is achieved and establishes the criteria for performance. The competencies are divided into 13 sections: fundamental drafting terminology, sketching, mechanical drawing, lettering, geometry, views, techniques and applications, inking, dimensioning, shop processes, working drawings, pictorial drawings, and graphical presentation. (YLB)

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CORE COMPETENCIES FOR BASIC DRAFTING

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LOS ANGELES UNIFIED SCHOOL DISTRICT
Manpower Program Development Unit
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CE 041 206

PREFACE

The competencies for Drafting are designed to cover basic principles and practices for beginner drafters. The competencies are presented as a series of goal statements followed by one or more "indicator" statements. An indicator is a performance objective describing an ability, which, upon attainment, will establish competency for the stated goal.

Indicator statements are further qualified by a series of "benchmark" statements. A "benchmark" is an observable behavior. Benchmarks describe what the trainee will do to prove that he is demonstrating achievement of the performance objective. Benchmarks are an end result, they do not describe how the trainee learned the behavior, they only state what the behavior is. There may be one or more benchmarks (behaviors) for each indicator statement (performance objective). Benchmark statements are followed by an "assessment" statement. The assessment statement describes how the observer determines that the benchmark is achieved. Assessment statements establish the criteria for performance. Instructor, class member consensus opinion, or combination of instructor input and trainee input may contribute to the final determination of evaluation criteria. The assessments that are shown for Drafting, have been established from instructional input and industry standards.

USE OF THE COMPETENCIES

The integration of the material into course curriculums is dependent on the instructor providing JTPA training services. Selection of the competencies is based on participant need and compatibility with the training requirements which are needed to develop drafting skills in the beginning student. The identification of Drafting competencies does not attempt to provide teaching methodology. The statements present a consensus opinion of optimum skill level for youth entering a drafting program.

VALIDATION

The competencies were developed from research and direct experience in the instruction of JTPA participants. Validation of the attached material was achieved through a consensus of instructional staff and employer Advisory Boards. Their collective opinion was formed from research and data, which provided the basis for the selection of Drafting competencies.

ACKNOWLEDGEMENTS

Appreciation is extended to the Los Angles Unified School District's Skills Center Coordinators, counselors and instructional staff who have provided their time and cooperation during the research and data collection stages of this project.

Competencies have been written by Claire Werner with the assistance of Ray Calderon, Drafting Instructor.

Bernardo R. Sandoval, Director
Manpower Program Development
January, 1985

TABLE OF CONTENTS

Terminlogy.....Page 1

Sketching.....Page 4

Mechanical Drawing.....Page 11

Lettering.....Page 21

Geometry.....Page 29

Views.....Page 33

Techniques and Applications.....Page 36

Inking.....Page 40

Dimensioning.....Page 44

Shop Processes.....Page 51

Working Drawings.....Page 53

Pictorial Drawings.....Page 56

Graphical Presentation.....Page 63

FUNDAMENTAL DRAFTING TERMINLOGY

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has an understanding of fundamental drafting terminlogy.

INDICATOR: The trainee demonstrates the ability to use drafting terminlogy appropriately.

BENCHMARK: The traine completes an exam on drafting vocabulary with no less than 80% accuracy.

ASSESSMENT: The trainee successfully passes a drafting vocabulary exam in which he/she identifies the meaning of common drafting terms.

The following vocabulary words will be included on the exam:

1) artistic drawings
2) technical drawings
3) freehand sketch
4) mechanical drawings
5) layouts
6) drafter
7) working drawing
8) dimensions
9) alphabet of lines
10) three view drawing
11) blue prints
12) projections

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has an understanding of fundamental drafting terminlogy.

INDICATOR: The trainee demonstrates the ability to use drafting terminlogy appropriately.

BENCHMARK: The trainee states the primary goals of technical drawing.

ASSESSMENT: The trainee states:

1) A detail drawing must be accurate.

2) A detail drawing must be done with proper technique, or good workmanship.

3) A detail drawing must be neat.

4) A detail drawing must be made with speed.

SKETCHING

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands how freehand sketching is used in technical drawing.

INDICATOR: The trainee demonstrates the ability to draw freehand sketches in the process of developing technical drawings.

BENCHMARK: The trainee states the function of freehand sketching in drafting.

ASSESSMENT: The trainee states:

It is a means of expression to anyone. It is an effective way to get an idea across when words fail. It is an aid to verbal language. Sketches are used to formulate, express, and record new ideas.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands how freehand sketching is used in technical drawing.

INDICATOR: The trainee demonstrates the ability to draw freehand sketches in the process of developing technical drawings.

BENCHMARK: The trainee identifies the materials needed to make a sketch.

ASSESSMENT: The trainee states:

1) pencil

2) paper

3) eraser

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands how freehand sketching is used in technical drawing.

INDICATOR: The trainee demonstrates the ability to draw freehand sketches in the process of developing technical drawings.

BENCHMARK: The trainee sketches objects in proper proportion.

ASSESSMENT: The trainee has estimated effectively the height, width, and depth of an object and has produced a drawing that has all its parts in the correct size as compared to all other parts.

Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands how freehand sketching is used in technical drawing.

INDICATOR: The trainee demonstrates the ability to draw freehand sketches in the process of developing technical drawings.

BENCHMARK: The trainee draws arcs and circles.

ASSESSMENT: The trainee draws arcs and circles freehand. Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands how freehand sketching is used in technical drawing.

INDICATOR: The trainee demonstrates the ability to draw freehand sketches in the process of developing technical drawings.

BENCHMARK: The trainee follows the correct procedure when sketching a view.

ASSESSMENT: The trainee proceeds as follows:

1) Sketches in the large main areas lightly. The main areas are in correct proportion.

2) Blocks in construction for areas and circles, lightly.

3) Dims all lines with the Artgum, and then heavy-in all lines, making them clean-cut and dark.

Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT:	The trainee understands how freehand sketching is used in technical drawing.
INDICATOR:	The trainee demonstrates the ability to draw freehand sketches in the process of developing technical drawings.
BENCHMARK:	The trainee completes no less than three one-view sketching problems.
ASSESSMENT:	The trainee's response to sketching problems are approved by the instructor for correctness and skill attainment.

MECHANICAL DRAWING

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands basic principles and practices of mechanical drawing.

INDICATOR: The trainee demonstrates the correct use of drawing instruments.

BENCHMARK: The trainee identifies and names equipment used in technical drawing.

ASSESSMENT: Given a picture of drawing tools the trainee identifies and names the following:

Drawing board
T-square
Set of drawing instruments
45° triangle
30° X 60° triangle
Ames Lettering Guide
Engineers scale
Architects scale
Irregular curve
Protractor
Drawing pencils
Sandpaper pad (or file)
Pencil eraser
Artgum eraser
Erasing shield
Technical pen
Black drawing ink
Drawing paper
Drafting tape
Dusting brush
Lead for mechanical pencil

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands basic principles and practices of mechanical drawing.

INDICATOR: The trainee demonstrates the correct use of drawing instruments.

BENCHMARK: During the process of producing technical drawings, the trainee selects the appropriate tools, and uses them correctly.

ASSESSMENT: Instructor observation of student performance, indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands basic principles and practices of mechanical drawing.

INDICATOR: The trainee demonstrates the correct use of drawing instruments.

BENCHMARK: The trainee demonstrates the correct use of pencils by completing an assignment to draw the alaphabet of lines.

ASSESSMENT: The trainee successfully draws the following line types:

PENCIL LINES

Border Line
Visible Line
Construction Line
Section Line
Hidden Line
Center Line
Dimension Line
Extension Line
Cutting-Plane Line
Short-Break Line
Long-Break Line
Phantom Line

Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands basic principles and practices of mechanical drawing.

INDICATOR: The trainee demonstrates the correct use of drawing instruments.

BENCHMARK: The trainee uses drawing instruments to draw various types of angles.

ASSESSMENT: The trainee draws inclined lines, vertical lines, parallel lines, perpendicular lines. Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands basic principles and practices of mechanical drawing.

INDICATOR: The trainee demonstrates the correct use of drawing instruments.

BENCHMARK: The trainee keeps his/her tools clean, and the drawings neat.

ASSESSMENT: The trainee follows simple rules to assure that his/her work will be clean and neat. The following precautions are observed:

1) When moving a T-square, the blade is tilted up.
2) To move a triangle, it is picked up with finger nail.
3) Never sharpen pencil over a drawing.
4) Removes graphite from pencil with a clean cloth.
5) Keeps sandpaper pad or file in envelope.
6) Never places articles on drawing.
7) Washes hands frequently, using soap.
8) Does not rub off eraser crumbs with hand.
9) Uses a dusting brush.
10) Avoids perspiring on drawing.
11) Avoids running hands through hair or facial make-up and then putting marks on the drawing.
12) When erasing, protects other lines with erasing shield.
13) When discussing picture, touches drawing only with back of finger nail.
14) When not drawing, covers drawing with sheet of paper.
15) When lettering, places paper under hand.
16) Cleans T-square and triangles with Artgum, or water.
17) Carries drawings in a flat large envelop.

Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands basic principles and practices of mechnaical drawing.

INDICATOR: The trainee demonstrates the correct use of lines on technical drawings.

BENCHMARK: The trainee draws simple mecharical drawings demonstrating the correct use of lines.

ASSESSMENT: The trainee uses the correct line types to produce a mechancial drawing. Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands basic principles and practices of mechanical drawing.

INDICATOR: The trainee demonstrates the ability to select and use scales effectively to produce technical drawings.

BENCHMARK: The trainee identifies and names two types of scales.

ASSESSMENT: Given a set of scales, the trainee identifies and names an Architects scale, and Engineers scale.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands basic principles and practices of mechanical drawing.

INDICATOR: The trainee demonstrates the ability to select and use scales effectively to produce technical drawings.

BENCHMARK: The trainee utilizes scales correctly when producing technical drawings.

ASSESSMENT: Given mechanical drawing problems, the trainee uses the appropriate scale effectively.

Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands basic principles and practices of mechanical drawing.

INDICATOR: The trainee demonstrates the ability to produce mechanical drawings.

BENCHMARK: The trainee selects and uses the appropriate equipment to produce technical drawings.

ASSESSMENT: Given simple mechanical drawing problems, the trainee responds by effectively using drawing equipment including scales, compass, dividers, and irregular or French curves to produce a finished drawing.

Instructor indicates satisfactory completion.

LETTERING

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of basic lettering techniques.

INDICATOR: The trainee demonstrates various lettering techniques.

BENCHMARK: The trainee identifies and names the three basic types of letters most commonly used.

ASSESSMENT: The trainee identifies and names the following:

1) Roman letters

2) Gothic letters

3) Text letters

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of basic lettering techniques.

INDICATOR: The trainee demonstrates various lettering techniques.

BENCHMARK: The trainee distinguishes between Standard Vertical Letters and Standard Inclined Letters.

ASSESSMENT: Given two sets of letters, the trainee identifies the vertical letters, and the inclined letters.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of basic lettering techniques.

INDICATOR: The trainee demonstrates various lettering techniques.

BENCHMARK: The trainee states the principles to observe to have uniformity in lettering.

ASSESSMENT: The trainee states:

1) Never mix capitals and lowercase letters.
2) Use guide lines to prevent irregularities.
3) Avoid thick-and-thin strokes.
4) The background areas between letters should appear equal.
5) Spaces between words should not be too small or too large.
6) Spaces between letters should not be too large or too small.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of basic lettering techniques.

INDICATOR: The trainee demonstrates various lettering techniques.

BENCHMARK: The trainee uses a grid sheet to write vertical capital letters and numerals.

ASSESSMENT: Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of basic lettering techniques.

INDICATOR: The trainee demonstrates various lettering techniques.

BENCHMARK: The trainee writes words using capital letters as appropriate.

ASSESSMENT: The trainee spaces letters closely and words are "openly" spaced. Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of basic lettering techniques.

INDICATOR: The trainee demonstrates various lettering techniques.

BENCHMARK: The trainee writes words using vertical letters.

ASSESSMENT: Trainee's work is neat and clean. Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of basic lettering techniques.

INDICATOR: The trainee demonstrates various lettering techniques.

BENCHMARK: The trainee draws large letters using T-square, triangles, and compass, then "fills-in" the letters.

ASSESSMENT: The trainee completes a project requiring large lettering, his work is neat and clean, lines are crisp, no smudging.

Instructor indicates satisfactory completion.

GEOMETRY

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has an understanding of fundamental geometry used in technical drawing.

INDICATOR: The trainee recognizes common geometric shapes encountered in technical drawing.

BENCHMARK: The trainee identifies common geometric shapes most often used in technical drawing.

ASSESSMENT: Given an exam on identification of geometric shapes, the trainee will match the shape with the correct geometric term. He/she will complete the exam with no less than 80% accuracy.

The following terms and shapes will be shown:

PARTS OF A CIRCLE
- quadrant
- diameter
- radius
- tangent
- circumference

ANGLES
- right angle
- acute angle
- obtuse angle
- complementary angles
- supplementary angles

TRIANGLES
- equilateral
- isosceles
- scalene
- right triangle

QUADRILATERALS
- square
- rectangle
- trapezoid

REGULAR POLYGONS
- pentagon
- hexagon
- octagon

THE 5 REGULAR SOLIDS
- tetrahedron
- hexahedron
- octahedron
- dodecahedron
- icosahedron

PARALLELEPIDEDS
- right square
- oblique rectangular

PRISMS
- right rectangular
- right triangular

CYLINDERS
- right circular
- oblique circular

PYRAMIDS
- right triangular
- right square
- oblique pentagonal

CONES
- right circular
- oblique circular

SPHERE

TORUS

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has an understanding of fundamental geometry used in technical drawing.

INDICATOR: The trainee recognizes common geometric shapes encountered in technical drawing.

BENCHMARK: The trainee identifies common symbols used in geometric construction.

ASSESSMENT: The trainee identifies the following symbols:

angle ∠ singular ∠s plural

center line ℄

perpendicular ⊥

triangle △ singular △s plural

diameter ∅

square □

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has an understanding of fundamental geometry used in technical drawing.

INDICATOR: The trainee recognizes common geometric shapes encountered in technical drawing.

BENCHMARK: The trainee computes the circumference of a circle.

ASSESSMENT: The trainee uses the following formula accurately:

3.14 X diameter of the circle = circumference

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT:	The trainee has an understanding of fundamental geometry used in technical drawing.
INDICATOR:	The trainee recognizes common geometric shapes encountered in technical drawing.
BENCHMARK:	The trainee effectively responds to no less than three drafting geometry problems.
ASSESSMENT:	Given no less than three simple geometric construction problems, the trainee produces correct drawings. Instructor indicates satisfactory completion.

VIEWS

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands concepts used to develop various views of objects.

INDICATOR: The trainee demonstrates the ability to draw objects in a series of views.

BENCHMARK: The trainee draws three views and learns how to visualize angles in different views. He/she identifies the true lenght. He/she uses hidden lines and the circle template to make small circles.

ASSESSMENT: Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee understands concepts used to develop various views of objects.

INDICATOR: The trainee demonstrates the ability to draw objects in a series of views.

BENCHMARK: The trainee makes drawings of three views, and learns the meaning of key way, ream and drill, and further visualizes angles in different views, and the height, width and depth of an object.

ASSESSMENT: The trainee makes the following drawings successfully:

1) Operating Arm

2) Swing Bracket

3) Base Fixture

4) Bearing Cup

Instructor indicates satisfactory completion.

TECHNIQUES AND APPLICATIONS

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of various techniques and applications used to produce technical drawings.

INDICATOR: The trainee demonstrates an understanding of techniques and applications used to produced technical drawings.

BENCHMARK: The trainee identifies the elements of having "good" drafting pencil technique.

ASSESSMENT: The trainee states:

1) Light construction lines.

2) Dense black lines.

3) Correct line thickness and dash lenghts.

4) Accented ends of dashes.

5) Sharp, clean corners.

6) Smooth tangencies.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of various techniques and applications used to produce technical drawings.

INDICATOR: The trainee demonstrates an understanding of techniques and applications used to produce technical drawings.

BENCHMARK: The trainee names the three ways a drafter may transfer the depth dimension form the top to the side view or the reverse.

ASSESSMENT: The trainee states:

1) Use of the 45° mitre line.

2) Use of dividers.

3) Use of the scale.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of various techniques and applications used to produce technical drawings.

INDICATOR: The trainee demonstrates an understanding of techniques and applications used to produce technical drawings.

BENCHMARK: The trainee completes no less than three mechanical drawings.

ASSESSMENT: The trainee completes mechanical drawings as assigned by instructor. Drawing projects will be selected from the following:

1) Bearing Plate
2) Cutter Holder Show
3) Fixture Base
4) Cross Base
5) Starting Catch
6) Bed Plate
7) Lap Dovetail
8) Book End
9) Dovetail Slide
10) Dovetail Finger
11) Switch Bracket
12) Adjustor Block
13) Riveting Hammer Head
14) Guide Base
15) Support Bracket
16) Garage Door Handle
17) Trunion Block

INKING

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of the basic processes used to ink a drawing.

INDICATOR: The trainee demonstrates the ability to ink technical drawings.

BENCHMARK: The trainee uses a technical pen to trace over lines on a technical drawing.

ASSESSMENT: The trainee uses the technical pen correctly, he/she observes the following guidelines:

1) Fills the pen to a height of about 1/4" from top of resevior.

2) Horizontal lines are drawn from left to right along the T-square with the pen held vertically.

3) Vertical lines are drawn upward along the left-hand edge of the triangle.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT:	The trainee has knowledge of the basic processes used to ink a drawing.
INDICATOR:	The trainee demonstrates the ability to ink technical drawings.
BENCHMARK:	The trainee inserts a pen attachment to a compass and traces over circles and arcs on a technical drawing.
ASSESSMENT:	The trainee demonstrates the correct use of inking with a compass. Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of the basic processes used to ink a drawing.

INDICATOR: The trainee demonstrates the ability to ink technical drawings.

BENCHMARK: The trainee uses the Leroy Lettering Set.

ASSESSMENT: The trainee completes no less than three lettering assignments which require the use of the Leroy Lettering Set. Instructor indicates satisfactory completion.

DIMENSIONING

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of dimensioning concepts.

INDICATOR: The trainee demonstrates the ability to solve dimensioning problems when producing technical drawings.

BENCHMARK: The trainee states the purpose of dimensioning.

ASSESSMENT: The trainee states:

In order for a drawing to provide complete information so that an object can be made from the drawing, the drawing must reflect two major things, (1) views, which describe the shape of the object, and (2) dimensions and notes, giving sizes and other shop information.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of dimensioning concepts.

INDICATOR: The trainee demonstrates the ability to solve dimensioning problems when producing technical drawings.

BENCHMARK: The trainee identifies the four types of lines used for dimensioning.

ASSESSMENT: The trainee states:

1) Extension line

2) Dimension line

3) Center line

4) Leader

These are all drawn thin but dark, with a 2-H lead pencil.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of dimensioning concepts.

INDICATOR: The trainee demonstrates the ability to solve dimensioning problems when producing technical drawings.

BENCHMARK: The trainee completes a drawing showing the correct dimensioning conventions.

ASSESSMENT: The trainee drawing shows the correct application of arrowheads, dimensioning figures, inch marks, direction of dimension figures, and finish marks.

Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of dimensioning concepts.

INDICATOR: The trainee demonstrates the ability to solve dimensioning problems when producing technical drawings.

BENCHMARK: The trainee provides the correct dimensions for angles, arcs, fillets and rounds, and shows the accurate placement of dimensions.

ASSESSMENT: Given an assignment to measure and draw dimensions of angles, arcs, fillets and rounds, the trainee completes the assignment correctly. Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of dimensioning concepts.

INDICATOR: The trainee demonstrates the ability to solve dimensioning problems when producing technical drawings.

BENCHMARK: The trainee follows the correct procedure in applying dimensions.

ASSESSMENT: The trainee proceeds as follows:

1) Draws extension lines dark and sharp, using a medium pencil with a sharp conical point. (F or H lead)

2) Uses the scale to space the dimensions at least ½" from the object and ½" apart. Draws the dimension lines dark and sharp, leaving gaps for the dimension figures.

3) Draws all arrowheads about 1/8" long and very narrow.

4) Adds all dimension figures and lettering.

Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of dimensioning concepts.

INDICATOR: The trainee demonstrates the ability to solve dimensioning problems when producing technical drawings.

BENCHMARK: The trainee completes assignments which require he/she solve dimensioning problems for a variety of shapes and situations.

ASSESSMENT: The trainee is given selected assignments to provide dimensions for drawings for no less than five of the following:

1) Size dimensions of cones, pyramids, and spheres.

2) Location dimensions.

3) Contour dimensions.

4) Rounded ends.

5) Dimensioning curves.

6) Mating dimensions.

7) Pattern and machine dimensions.

8) Providing notes on a drawing.

9) Showing dimensions in decimals.

10) Provide dimensions for basic hole and basic shaft systems.

Trainee solves dimensioning problems effectively. Instructor indicates satisfactory completion.

SHOP PROCESSES

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of various shop processes.

INDICATOR: The trainee demonstrates the ability to describe various shop processes.

BENCHMARK: The trainee completes an exam which tests his/her ability to relate basic information about various shop processes.

ASSESSMENT: The trainee completes an exam with no less than 70% accuracy. The trainee describes in writing minimum information about the following shop processes:

1) Sand Casting
2) Fillets and Rounds
3) Runouts
4) Conventional Edges
5) Forging
6) Die Casting
7) Welding
8) Shop Measurement Techniques
9) Lathe
10) How finished holes are made.
11) Grinding Machine
12) Broaching
13) Heat treating

Instructor indicates satisfactory completion.

WORKING DRAWINGS

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has a general understanding of elements on a working drawing.

INDICATOR: The trainee demonstrates the ability to interpret the meaning of selected elements on a working drawing.

BENCHMARK: The trainee identifies the steps that are followed in the development of a "working drawing" in a typical industrial plant.

ASSESSMENT: The trainee states that the following steps typically are followed in the development of a working drawing:

1) A designer or engineer makes a sketch of an idea.

2) Next a layout drawing or design assembly drawing is made.

3) After the layout has been approved by the chief engineer, it is turned over to the drafter to make the production drawings.

4) Finally an assembly drawing will be needed to guide the workers in assembling parts properly.

5) If ink is required, the assembly drawing is sent to a tracer, this is a drafter whose speciality is doing ink work.

6) Before blueprints are made, the production drawings are checked by a checker.

7) If the mechanism contains new ideas, a patent drawing is made.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has a general understanding of elements on a working drawing.

INDICATOR: The trainee demonstrates the ability to interpret the meaning of selected elements on a working drawing.

BENCHMARK: The trainee solves problems taken from actual blueprints of machines or devices manufactured and in use.

ASSESSMENT: The trainee studies blueprints and solves problems correctly by drawing sketches and then developing the sketches into accurate drawings. Instructor indicates satisfactory completion.

PICTORIAL DRAWINGS

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of the concepts used to develop pictorial drawings.

INDICATOR: The trainee demonstrates the ability to produce various types of pictorial drawings.

BENCHMARK: The trainee defines the term "pictorial drawing".

ASSESSMENT: The trainee states:

A pictorial drawing is one in which the object is viewed in such a position that several faces appear in a single view.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of the concepts used to develop pictorial drawings.

INDICATOR: The trainee demonstrates the ability to produce various types of pictorial drawings.

BENCHMARK: The trainee names the three most common types of pictorial drawings.

ASSESSMENT: The trainee states:

1) Perspective

2) Isometric

3) Oblique

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of the concepts used to develop pictorial drawings.

INDICATOR: The trainee demonstrates the ability to produce various types of pictorial drawings.

BENCHMARK: The trainee completes drawings of ellipses.

ASSESSMENT: The trainee proceeds as follows:

1) Lightly sketch the enclosing rectangle and mark the approximate mid-points of the sides.

2) Sketches light tangent arcs at the mid-points, and completes the ellipse.

3) Before heavying-in the final ellipse, dims all construction lines with Artgum.

Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of the concepts used to develop pictorial drawings.

INDICATOR: The trainee demonstrates the ability to produce various types of pictorial drawings.

BENCHMARK: The trainee completes no less than three isometric mechanical drawings.

ASSESSMENT: The trainee follows the correct procedure to produce an effective mechanical drawing. Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has knowledge of the concepts used to develop pictorial drawings.

INDICATOR: The trainee demonstrates the ability to produce various types of pictorial drawings.

BENCHMARK: The trainee completes no less than three oblique mechanical drawings.

ASSESSMENT: The trainee follows the correct procedure to produce an effective mechanical drawing. Instructor indicates satisfactory completion.

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT:	The trainee has knowledge of the concepts used to develop pictorial drawings.
INDICATOR:	The trainee demonstrates the ability to produce various types of pictorial drawings.
BENCHMARK:	The trainee completes no less than one each of a one-point perspective drawing and a two-point perspective drawing.
ASSESSMENT:	Drawings are neat and clean. Finished product meets with instructor's approval.

G`APHICAL PRESENTATION

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has an understanding of graphical presentation.

INDICATOR: The trainee demonstrates the ability to present information in graphical format.

BENCHMARK: The trainee identifies the various types of graphical presentation.

ASSESSMENT: The trainee identifies and names different graphical presentations as follows:

1) Bar Chart

2) Line Chart

3) Pie Chart

4) Pictographs

COMPETENCY AREA: DRAFTING

COMPETENCY STATEMENT: The trainee has an understanding of graphical presentation.

INDICATOR: The trainee demonstrates the ability to present information in graphical format.

BENCHMARK: The trainee draws a bar chart.

ASSESSMENT: The trainee proceeds as follows:

1) Draws a vertical line called the Y-axis or ordinate and a horizontal line called the X-axis or abscissa. Point of the intersection is 0 on the chart.

2) Selects a suitable scale for the points along the Y-axis. Letters the numbers at convenient intervals. Draws horizontal lines across the chart at these locations.

3) Blocks in bars, spacing them far enough apart to permit lettering the names at the bottom.

4) Fills-in the bars solid, or shade with colored pencil.

5) Adds necessary lettering, including a title.

Instructor indicates satisfactory completion.